MICROLAB STAR

Device Driver User Guide

Agilent Technologies

Notices

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Agilent Technologies

Letter to our Customers

Dear Customer,

The Agilent Technologies acquisition of Velocity11 resulted in the following changes:

- Creation of Agilent Technologies Automation Solutions, formerly Velocity11
- Renaming of some Velocity11 products
- New Customer Service and Technical Support contact information
- New website address for product information

Please make a note of the following changes as they impact this user guide.

Velocity11 product name changes

Velocity11 product name	Changes to ...
Access2 Automated Microplate Loader	Automated Centrifuge Loader
Element Automation System	BioCel 900 System
IWorks Device Driver Programming Interface	VWorks DCL Interface
PlatePierce Seal Piercing Station	Microplate Seal Piercer
VCode Barcode Print and Apply Station	Microplate Barcode Labeler
Velocity11 Robot	3-Axis Robot
VHooks Integration Interface	VWorks Hooks Interface
VPrep Pipetting System	Vertical Pipetting Station
VSpin Microplate Centrifuge	Microplate Centrifuge
VStack Labware Stacker	Labware Stacker

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Introduction

1

This chapter introduces Velocity11 device drivers and provides some basic procedures that are needed to use them.

A Velocity11 device driver is software that plugs into VWorks or BenchWorks software to allow them to control a specific device.

Before reading this guide, you should be familiar with the VWorks or BenchWorks software user interface. Information about using VWorks or BenchWorks software can be found in the *VWorks Version 3 Automation Control User Guide* or *BenchWorks Automation Control User Guide*.

To set up and use Velocity11 device drivers, become familiar with the content in this guide as well as the guides for the devices that use VWorks or BenchWorks software.

This chapter contains the following topics:

- ❑ "Who should read this guide" on page 2
- ❑ "About Velocity11 user guides" on page 3
- ❑ "What this guide covers" on page 5
- ❑ "About devices" on page 6
- ❑ "About device drivers" on page 7
- ❑ "Installing device drivers" on page 9
- ❑ "Adding devices" on page 10
- ❑ "About diagnostics" on page 11
- ❑ "Opening diagnostics" on page 12
- ❑ "About profiles" on page 15
- ❑ "Setting the properties for a device" on page 16
- ❑ "Adding and linking Sub Process tasks" on page 19
- ❑ "Using JavaScript to set task parameters" on page 21
- ❑ "About reader output files" on page 22
- ❑ "About device initialization" on page 25

Who should read this guide

Job roles

This user guide is for people with the following job roles:

Job role	Responsibilities
Integrator	Someone who writes software and configures hardware controlled by device drivers.
Lab manager, administrator, or technician	Someone who is responsible for: ❑ Installing device drivers ❑ Managing device drivers ❑ Developing the applications that are run using device drivers ❑ Solving the more challenging problems that might arise ❑ Developing training materials and standard operating procedures for operators
Operator	Someone who performs the daily production work using the device driver and solves routine problems. Your organization may choose to create its own procedures for operators including the procedures in this guide.

Related topics

For information about...	See...
Contacting Velocity11	http://www.velocity11.com/contact.html
Accessing online help	“About Velocity11 user guides” on page 3
Device drivers	“About device drivers” on page 7

About Velocity11 user guides

About this topic

This topic describes the different formats of Velocity11 user information and explains how to access the user information.

Formats available

Velocity11 user information is provided to you as:

- ❑ Online help
- ❑ A PDF file
- ❑ A printed book

The information in each format is the same but each format has different benefits.

Where to find user information

Online help

The online help is added to your computer with the Velocity11 lab automation system software installation.

PDF file

The PDF file of the user guide is on the software CD that is supplied with the product.

Velocity11 website

You can search the online help or download the latest version of any PDF file from the Velocity11 website at www.velocity11.com.

Note: All Velocity11 user information can be searched from the website at www.velocity11.com.

Online help

The online help is the best format to use when you are working at the computer and when you want to perform fast or advanced searches for information.

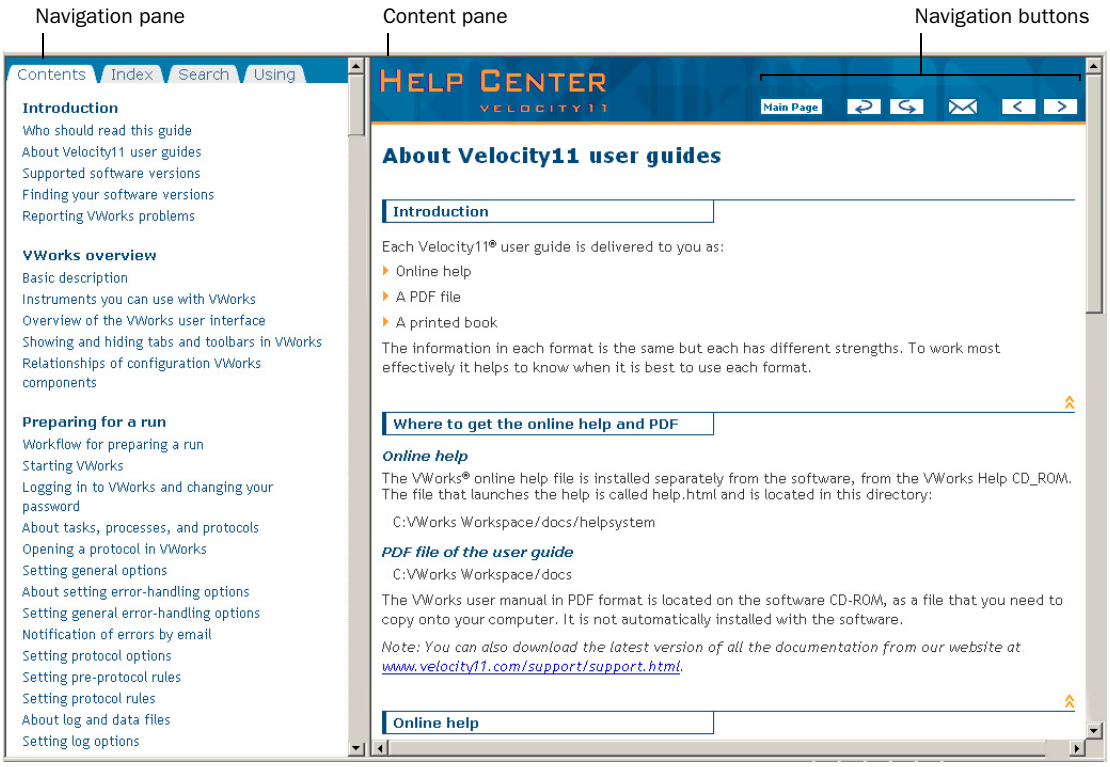
To open the online help:

1. In the Velocity11 lab automation software, press F1. The online help window opens.

Main features

The online help window contains the following:

- ❑ *Navigation pane*. Consists of four tabs. The Contents, Index, and Search tabs provide different ways to locate information. The Using tab contains information about using the help system.
- ❑ *Content pane*. Displays the online help topics.
- ❑ *Navigation buttons*. Enables you to navigate through the pages.The online help includes a navigation pane, content pane, and navigation buttons.



PDF user guides

Computer requirements

To open a user guide in PDF format, you need a PDF viewer. You can download a free PDF viewer from the internet.

Printing and searching

The user guides in PDF format are mainly for printing additional copies. You can perform simple searches in the PDF file, although these searches are much slower than online help searches.

More information

For more information about using PDF documents, see the user documentation for the PDF viewer.

Related topics

For information about...	See...
Who this guide is for	“Who should read this guide” on page 2
What’s in this guide	“What this guide covers” on page 5
Device driver plug-ins	“About device drivers” on page 7

What this guide covers

About this topic

This topic presents an overview of what procedures and information are provided in this user guide.

This guide explains how to:

- ❑ Install the driver for the device
- ❑ Configure the device in the device manager
- ❑ Set and use the tasks associated with the device
- ❑ Use *Device* Diagnostics

Also read

Information about device drivers not covered in this guide and about running VWorks or BenchWorks software can be found in the *VWorks Version 3 Automation Control User Guide* or the *BenchWorks Automation Control User Guide*.

Driver version

To find version information for a driver in VWorks:

1. Start VWorks.
2. Click **Help** and select **About VWorks**.

   The **About VWorks** dialog box lists the version numbers of all the current software for all the devices and plug-ins.

To find version information for a driver in BenchWorks:

1. Start BenchWorks.
2. Click **Help** and select **About BenchWorks**.

   The **About BenchWorks** dialog box lists the version numbers of all the current software for all the devices and plug-ins.

Firmware version

Some devices have firmware installed on them. Because each device is different, the version number may not be the same for all devices.

To find version information for device firmware:

1. Open ***Device*** **Diagnostics** dialog box.
2. Click **About**.

   The **About *Device* Control** message box appears displaying the current version of firmware.

What this guide does not cover

This guide does not cover the following:

- ❑ The operation of the device
- ❑ The operation of VWorks or BenchWorks software
- ❑ Velocity11 devices, such as the PlateLoc Sealer, VCode Microplate Labeler, and VPrep Pipettor when used in stand-alone mode

VWorks or BenchWorks compatibility

If you have purchased a device driver plug-in and are installing it yourself, check with the Velocity11 Technical Support to be sure your version of VWorks or BenchWorks software and the device driver plug-in are using the same version of IWorks software.

BenchWorks versions

Device driver plug-ins used with BenchWorks software may not include some newer features that were specifically added for use with VWorks software and that are described in this manual.

Related topics

For information about...	See...
Who this guide is for	"Who should read this guide" on page 2
User documentation	"About Velocity11 user guides" on page 3
Device driver plug-ins	"About device drivers" on page 7

About devices

About this topic

This topic presents a definition of a Velocity11 device and the device file.

Read this topic if you are unfamiliar with Velocity11 devices and VWorks or BenchWorks software.

Device defined

A device is an item on your lab automation system that has an entry in the device manager. A device can be a robot, an instrument, or a location on the lab automation system that can hold a piece of labware.

Examples of devices:

- ❑ Velocity11 robot
- ❑ Human robot
- ❑ PlateLoc Thermal Plate Sealer
- ❑ Labcyte Echo550
- ❑ Platepad
- ❑ VPrep shelf
- ❑ Waste

Device file defined

The data entered into the device manager and saved as a device file contains the configuration information for your devices.

Device file location

Device files have the file name format *file name*.dev and are stored in the folder location that you specify when saving the file.

Related topics

For information about...	See...
Device diagnostics	"About diagnostics" on page 11
Device profiles	"About profiles" on page 15
Adding a device to the device manager	"Adding devices" on page 10

About device drivers

About this topic

This topic describes what device drivers are and what they do.

Velocity11 device drivers enable mechanical devices or software programs to work with VWorks or BenchWorks software.

Read this topic if you are:

- ❑ An administrator in charge of installing device drivers and managing Velocity11 devices
- ❑ A lab automation system integrator who writes software and configures hardware controlled by VWorks or BenchWorks software

Device driver defined

A Velocity11 device driver enables VWorks or BenchWorks software to control and communicate with the specific type of device. Each type of device that you operate with VWorks or BenchWorks software requires a device driver.

For example, VWorks software uses the:

- ❑ VPrep Pipettor device driver to communicate with the Velocity11 VPrep Pipettor device
- ❑ Softmax Reader device driver to communicate with Molecular Devices readers

Plug-in defined

A plug-in is a software program that when added to another program extends it.

Plug-in device drivers

Some device drivers are incorporated directly into the VWorks or BenchWorks software application. Other device drivers are distributed as plug-ins. All the device drivers covered in this guide are the plug-in type.

Advantages of distributing device drivers as plug-ins are:

- ❑ You only need to install the plug-ins for the devices you use
- ❑ When new plug-ins become available, they can be easily added. There is no need to re-install the VWorks or BenchWorks software application

IWorks interface

The device driver plug-ins and VWorks or BenchWorks software use IWorks software as a common interface to communicate with each other. Using a common interface allows the creation of a device driver plug-in without the necessity of changing the software.

!! IMPORTANT !! Both VWorks or BenchWorks software and the device driver must be using the same version of IWorks to work properly.

Writing your own device driver

If you are a lab automation system integrator who writes software and configures hardware controlled by VWorks or BenchWorks software, you can write your own driver plug-in for a new device. Contact the Velocity11 Technical Support for information about how to do this.

What functions do the device drivers provide?

Once installed, the following items are enabled:

- ❑ Tasks associated with the device.

  Device-specific tasks appear in the Protocol Tasks list and are available for use in protocol editor processes.
- ❑ Task parameters associated with the device.

  Device-specific task parameters appear in the Protocol Task Parameters toolbar. These determine the conditions with which to execute the tasks of the device.
- ❑ Diagnostic commands specific to the device.

  Device-specific diagnostic commands and options appear in the *Device* Diagnostics dialog box. These commands enable direct control of the device.

Related topics

For information about...	See...
Adding a device to the device manager	“Adding devices” on page 10
Opening diagnostics	“Opening diagnostics” on page 12
Installing a device driver	“Installing device drivers” on page 9
Devices	“About devices” on page 6

Installing device drivers

About this topic

Devices are integrated into VWorks or BenchWorks software using device driver plug-ins. Plug-ins need to be installed before the device can be configured and used.

This topic describes how to install device drivers if they are not already installed on your system. Read this topic if you are an administrator in charge of managing Velocity11 devices.

Procedure

To install device drivers:

1. Insert the device driver installation disc into the CD-ROM of the computer running VWorks or BenchWorks software.
2. Follow the on-screen instructions for installation, selecting the default values when available.
3. When finished, exit VWorks or BenchWorks software.
4. Log off Windows and restart your computer.
5. Start VWorks or BenchWorks software.

For this application...	The default location for the device driver is...
VWorks software	C:\VWorks Workspace\bin\plugins
BenchWorks software	C:\Program Files\Velocity11\BenchWorks\plugins

Related topics

For information about...	See...
Device drivers	“About device drivers” on page 7
Opening diagnostics	“Opening diagnostics” on page 12

Adding devices

About this topic

To configure your lab automation system to use a device, you need to add it to a device file in VWorks or BenchWorks software. The VWorks or BenchWorks software device manager uses the information in the device file to communicate and operate the device within the automation system.

This topic describes how to:

- ❑ Create a new device file (if one does not already exist)
- ❑ Add devices
- ❑ Save the device file

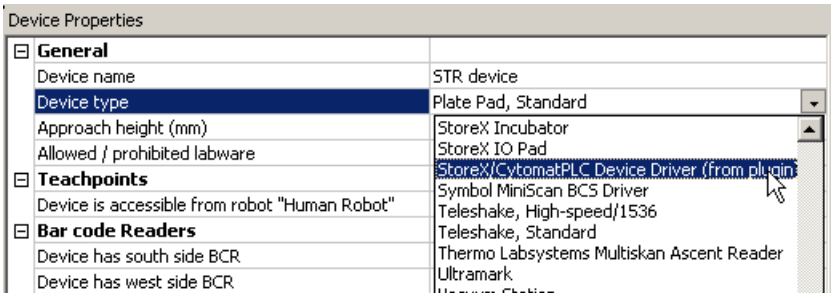
Read this topic if you are an administrator in charge of managing Velocity11 devices.

Procedure

To add devices to a device file:

1. Make sure that the devices are physically networked to the VWorks or BenchWorks software computer and turned on.
2. Start VWorks or BenchWorks software and login as an Administrator.
3. Do one of the following:
   - ◆ If you have an existing device file that you want to add to, select **File** > **Device File**, click **Open,** and select your device file.
   - ◆ If you are creating a new device file, select **File** > **Device File** and click **New**.
4. Click the **Device Manager** tab.
5. Click **New device** in the **Device List** toolbar and enter a name for the device you are adding.
6. In the device manager, set the **Device type**.

   The default type is **Plate Pad, Standard**.



7. Repeat step 5 and step 6 for each device.

8. Select **File** > **Device File** > **Save**.

   If you are creating a new device file, you are prompted to enter a name for your device file.

   Alternatively, you can select **File** > **Save All**. This saves the device file and the current protocol file at the same time.

Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Setting generic device properties	"Setting the properties for a device" on page 16
Adding a sub-process to a protocol	"Adding and linking Sub Process tasks" on page 19
Opening diagnostics	"Opening diagnostics" on page 12

About diagnostics

About this topic

This topic presents an overview of diagnostics software.

Read this topic if you need to set up or troubleshoot a device running VWorks or BenchWorks software.

Background

Devices can be controlled in real time directly through the VWorks or BenchWorks software Diagnostics using simple commands.

Diagnostics software is used for:

- ❑ Troubleshooting
- ❑ Setting teachpoints
- ❑ Performing manual operations outside a protocol
- ❑ Creating and editing profiles

For example, if an error occurs during a run that leaves a plate and the robot where they should not be, you can use robot diagnostics to move the plate and return the robot to its home position.

Types of diagnostics software

Devices and robots manufactured by Velocity11 include their own diagnostics software. You can find instructions for using this software in the relevant user guide.

Related topics

For information about...	See...
Opening diagnostics	"Opening diagnostics" on page 12
Adding a device to the device manager	"Adding devices" on page 10
Device drivers	"About device drivers" on page 7
The definition of devices	"About devices" on page 6

Opening diagnostics

About this topic

Every device has diagnostics software to assist you with troubleshooting and setting up the device. This topic describes how to open a device's diagnostics in VWorks or BenchWorks software.

Read this topic if you need to access a device's diagnostics to perform a device setup task or manually operate a device.

Procedure 1

If you are using VWorks4 software

To open Diagnostics:

1. Click **Diagnostics** on the Control toolbar.

2. In the device file's window, select the device. Expand the general name of the device, if necessary.

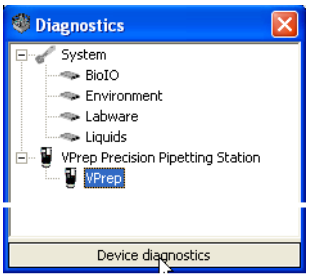
3. Click **Device diagnostics** located at the bottom of the window. The device's diagnostics dialog box opens.

If you are using VWorks3 or BenchWorks software

To open Diagnostics:

1. Click **Diagnostics** on the Control toolbar.

2. In the **Diagnostics** window, select thedevice. Expand the general name of the device, if necessary.



3. Click **Device diagnostics**. The device's diagnostics dialog box opens.

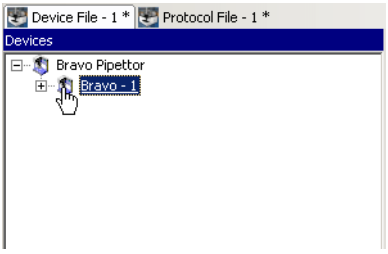
Procedure 2

If you are using VWorks4 software

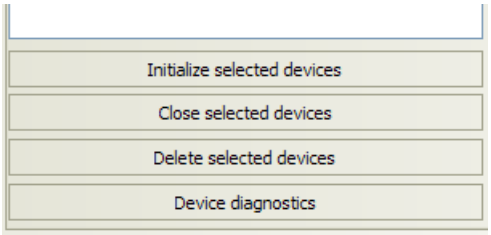
To open Diagnostics:

1. Click the **Device File** tab.
2. Select the device from the **Devices** toolbar.

   Expand the general name of the device, if necessary.



3. Click **Device diagnostics** located at the bottom of the **Devices** toolbar.

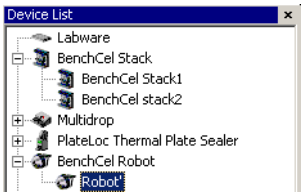


   The device's diagnostics dialog box opens.

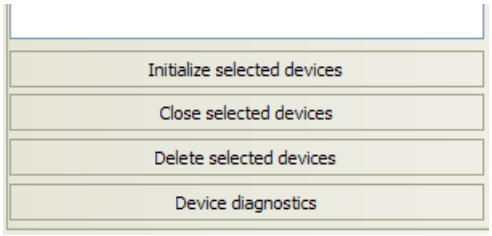
If you are using VWork3 or BenchWorks software

To open Diagnostics:

1. Click the **Device Manager** tab.
2. Select the device from the **Device List** toolbar. Expand the general name of the device, if necessary.



3. Click **Device diagnostics** located at the bottom of the **Device List** toolbar.



The device's diagnostics dialog box opens.

Related topics

For information about...	See...
Diagnostics	"About diagnostics" on page 11
About device drivers	"About device drivers" on page 7
Adding a device to the device manager	"Adding devices" on page 10
Setting generic device properties	"Setting the properties for a device" on page 16

About profiles

About this topic

This topic describes what profiles are and what they do.

Read this topic if you are an administrator in charge of managing Velocity11 devices.

Profiles defined

A profile contains the initialization settings needed for communication between a device and device driver. The data in a profile is used by VWorks or BenchWorks software to identify each device on the network.

A profile can also contain other basic settings that you are unlikely to change once set up.

Because profiles identify device driver devices on the network, each device driver device must have its own profile.

You can create, modify, and delete profiles as needed.

Stored settings

Profiles are stored in the Windows registry.

The settings stored in a device driver profile include:

- ❑ Whether the device is connected using serial or Ethernet
- ❑ If the device is connected using Ethernet, the Device ID of the device on the network
- ❑ If the device is connected using serial, the COM port that the controlling computer uses for communication
- ❑ Configuration of accessories

Related topics

For information about...	See...
Device drivers	“About device drivers” on page 7
Adding a device to the device manager	“Adding devices” on page 10
Opening device diagnostics	“Opening diagnostics” on page 12

Setting the properties for a device

About this topic

The device properties provide VWorks or BenchWorks software with additional information about the device's current configuration, such as which profile to use, and stores the information in the device file. The device file is automatically loaded when you open a protocol.

The device properties need to be set when configuring the device. Typically, these properties only need to be set once. This topic describes how to set the following device properties:

- ❑ General
- ❑ Teachpoint
- ❑ Barcode
- ❑ Location (for devices with multiple teachpoints)
- ❑ *Device* Properties

Read this topic if you are an administrator in charge of managing Velocity11 devices.

Before you start

Make sure that you have installed the device driver plug-in and have added the device to the device manager.

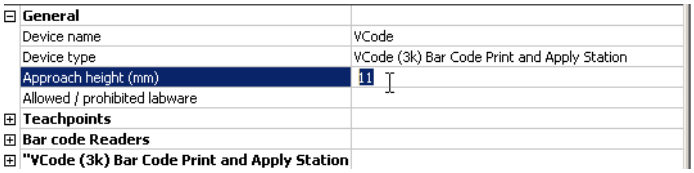
See "Related information" for procedures on how to do these tasks.

Setting general properties

To set the general properties for a device:

1. Click the **Device Manager** tab.
2. Select the device from the **Device List** toolbar. (Expand the device name, if necessary.)

   Note: For devices with **Locations**, see "Setting location properties" on page 17. If no Locations, continue with step 3.
3. In the **General** group, set the following:
   a. **Approach height**. This is the height to raise the robot gripper above the teachpoint when the robot moves the plate horizontally towards or away from it.



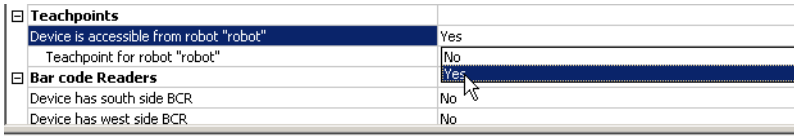
   b. **Allowed/prohibited labware**. Click the adjacent field to open the dialog box. Move the labware classes by selecting them and clicking one of the arrow buttons.
4. In the ***Device* Properties**, select the desired profile if it is not already selected.
5. Select **File** > **Device File** > **Save** to save the changes to the device file.

Setting teachpoints

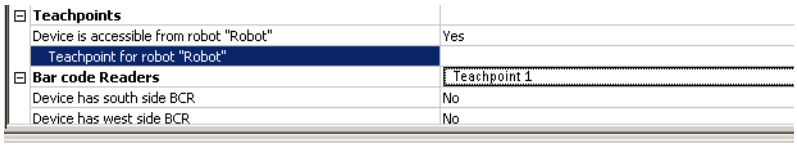
Teachpoints are the coordinates in space that a robot travels to in order to interact with a device. Only the devices that are accessible by robots are able to have teachpoints.

To set the teachpoint properties:

1. Open the **Device Properties** page.
2. In the **Teachpoints** property group, set the following:
   a. **Device is accessible from robot *robot's name***. Choose **Yes** or **No**.



   b. **Teachpoint for robot *robot's name***. Choose a file.



Setting barcode location

If your device has a barcode reader, indicate where the reader is located.

To set the barcode readers property:

1. In the **Barcode Readers** property group, set the side that has the barcode to **Yes**.

2. Enter the number of the COM port to which the device is connected.

Setting location properties

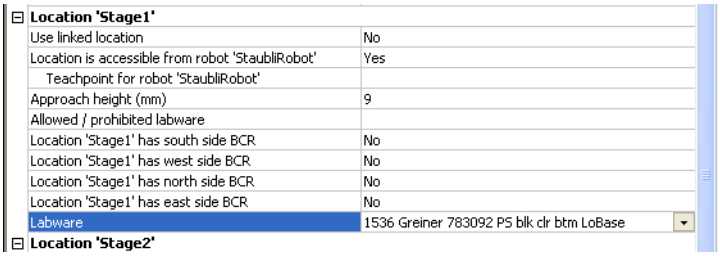
Note: The options available under Location groups might differ for software and hardware device drivers. Software devices do not have robot-accessible labware positions.

For hardware devices that have more than one robot-accessible labware position, the approach height, allowable/prohibited labware, teachpoint, and barcode properties are located under Location groups.

To set the Location properties:

1. *Hardware device drivers only.* Set the **Use linked location**. Follow the procedure in "Setting the Use linked location" on page 18.
2. *Hardware device drivers only* Set the **Teachpoints**. Follow the procedure in "Setting teachpoints" on page 17.

3. *Some software device drivers only.* Set the **Approach height** and **Allowed/prohibited labware**. Follow the procedure in "Setting general properties" on page 16.
4. Set the **Barcode Readers** location. Follow the procedure in "Setting barcode location" on page 17.
5. Assign the **Labware** used by the location by selecting the correct labware type from the list.



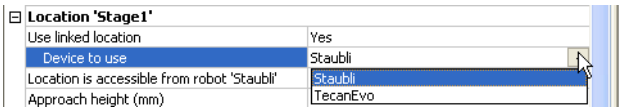
6. In the ***Device* Properties**, select the desired profile if it is not already selected.
7. Select **File** > **Device File** > **Save** to save the changes to the device file.

Setting the Use linked location

Currently, this feature is enabled for the special situations in which there is a storage device such as a PlateHub Carousel, StoreX, or Cytomat and a robot, such as the Velocity11 Translator robot that is shuttling plates between systems.

To use this feature, select yes and then select the device location to which you want to link. This tells the software that the current device location is the same physical location as the device selected from the Device to use list.

Note: Selecting this option when it is not enabled will have no effect on the system.



Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Installing a device driver plug-in	"Installing device drivers" on page 9
Profiles	"About profiles" on page 15
Adding a device to the device manager	"Adding devices" on page 10
Opening diagnostics	"Opening diagnostics" on page 12

Adding and linking Sub Process tasks

About this topic

This topic describes how to add a sub-process to a protocol and configure it. Read this topic if you are an administrator or technician and are responsible for creating protocols in VWorks or BenchWorks software.

Before you read this

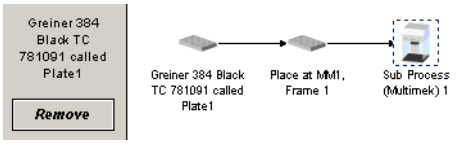
Before you read this topic, become familiar with the topics in the *VWorks Version 3 Automation Control User Guide* or *BenchWorks Automation Control User Guide* describing what a protocol is and how it is created.

Sub Process task defined

Sub Process tasks indicate the existence of a subroutine within a protocol. Sub-processes typically contain a series of liquid handling tasks used by devices such as the VPrep Pipettor or Multimek dispenser.

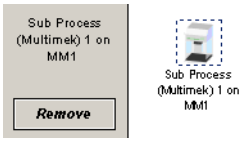
Adding a Sub Process task

The first step in creating a pipette process is to add a Sub Process task to the protocol editor. Drag the Sub Process icon into the process.



Setting Sub Process task parameters

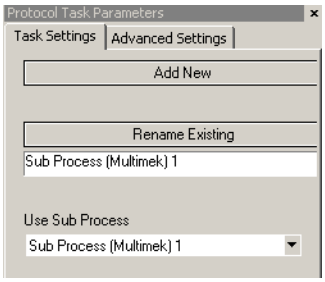
When you add the Sub Process task, a new sub-process is started in the pipette process editor. This process is identified by its sub-process link icon.



Because you can have more than one sub-process in a protocol, you must link the Sub Process task to the correct sub-process.

To link the Sub Process task to the correct sub-process:

1. In the **Protocol Editor**, add a Sub Process task to the protocol and then select it in the protocol sequence.
2. In the **Protocol Task Parameters** toolbar, select the sub-process that you want to use for this pipetting task from the **Use Sub Process** list.



3. If there is only one sub-process and you need to create a second one, click **Add New**.

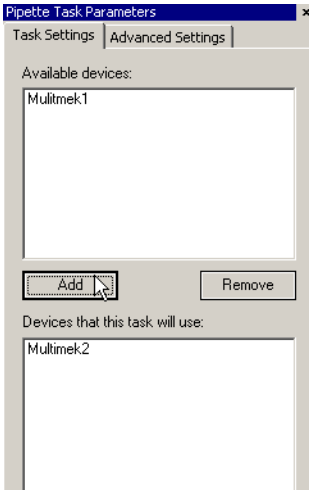
Associating the sub-process to a device

Because you can have more than one device that uses sub-processes on a lab automation system, you must link each sub-process link icon with one or more devices that you want the sub-process to be able to use. You do this by setting the parameter for the sub-process link icon.

To link a Sub Process task to a device:

1. In the **Pipette Process Editor**, select the **Sub Process** link icon.

2. In the **Available devices** list of the **Pipette Task Parameters** toolbar, select one or more pipettors to link to and click **Add**.



The selected pipettors move to the lower box and become available for use.

Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Setting common device properties	"Setting the properties for a device" on page 16
Adding a device to the device manager	"Adding devices" on page 10
Creating protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*

Using JavaScript to set task parameters

About this topic

JavaScript programs (scripts) can be used to change the parameters of a protocol task immediately before it is scheduled. This extends the capability of VWorks or BenchWorks software because the parameters can be changed dynamically during a run, based on the following:

- ❑ Information passed from an external source, such as a database
- ❑ The number of times the protocol has cycled
- ❑ Feedback on changing conditions during the run

This topic describes the use of JavaScript to set task parameters in a protocol.

Read this topic if you are an administrator or technician responsible for creating VWorks or BenchWorks software protocols and want to add functionality to a task using JavaScript.

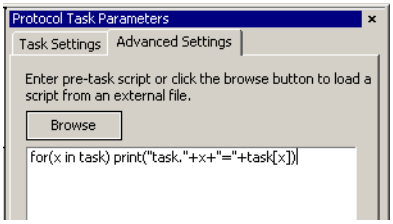
Where scripts are written

Scripts can be written in two ways:

- ❑ Directly into the box in the Advanced Settings tab of the Task Parameters toolbar
- ❑ As an external file that is located by clicking Browse in the Advanced Settings tab and navigating to its location on the hard drive

Note: You can also call an external file by embedding the "`open()`" function in the box.

The following screenshot displays a short script that prints the parameters of a task to the log toolbar, just before the task runs. In this case, the script is written directly in the Advanced Settings box.



For more information about using JavaScript, refer to the *VWorks Version 3 Automation Control User Guide* or the *BenchWorks Automation Control User Guide*.

Related topics

For information about...	See...
Using JavaScript in protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*

About reader output files

About this topic

Plug-in device drivers that are written for plate readers have a common way of naming their output files. This topic explains the concepts related to output file naming. By reading this topic, you will learn how to prevent data in the reader output files from being overwritten by newer data.

Read this topic if you are an operator who wants to make changes to the task parameters for one of these readers:

- ❑ VR4000
- ❑ Analyst GT
- ❑ Fusion
- ❑ Viewlux
- ❑ Tecan readers

Plug-in default output file

When you first install a reader device driver plug-in, all data recorded during a protocol or by a manual read using diagnostics software is written to a single file stored in the C: drive.

The exact name of the file is specific to the device. For example, the RVSI VR4000 device driver creates a file with the name vialreaderresults.txt.

This file can only store data for one read, which means that the set of data for each read overwrites the last set in the file. To avoid this problem you must set up an output file naming convention.

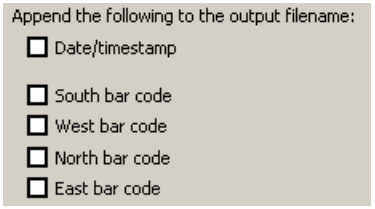
Profile default output file name

Some device drivers allow more than one device of that type to be used in the lab automation system. In this case, each device must have its own profile. Even if you have only one device, you can still set up multiple profiles for it, with each storing different settings.

In these cases, you probably want each profile to have a separate default output filename to prevent the data from runs using one profile overwriting those of another.

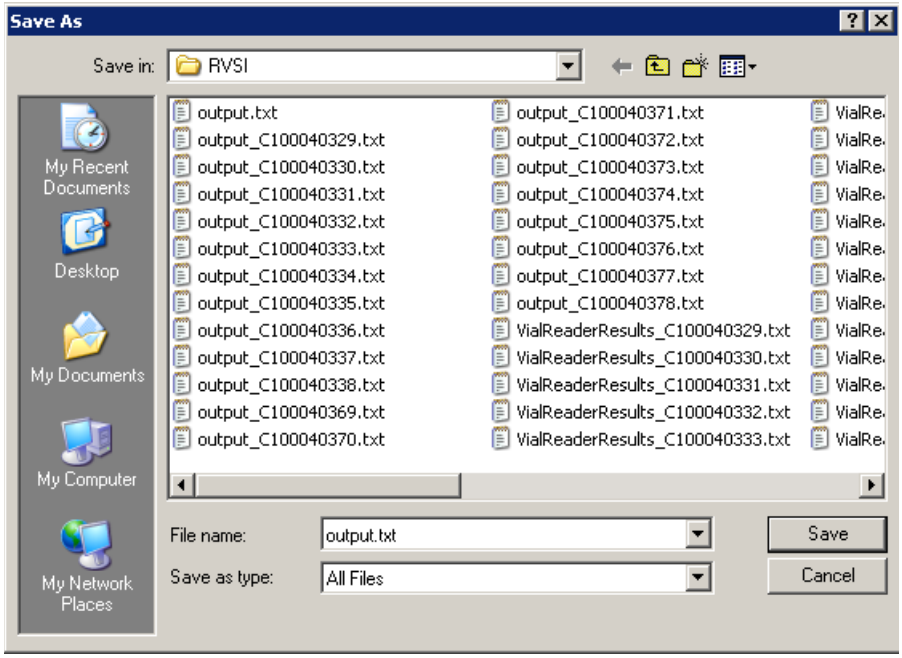
Filename suffixes

To prevent the data from one read overwriting the data from another, you need to append a variable suffix to the file name. You can append a date/time stamp and one or more bar codes on the rack or plate.



Example

The example output file folder below shows that a profile default file name of output.txt was created at one time. At another time, a suffix was appended in the profile for the device driver, which added a barcode identifier to the file name (for example output_C100040329.txt).



Overriding output file names with tasks

You can override the default output file name that is set in the profile using the Output filename property of the Read task parameters.

"Read tubes" properties	
Use tubes expected parameter	No
Tubes expected (0-96)	96
Output filename	

This allows you to use different output file names for every task.

The suffix used for the file name that you set in the task parameters is taken from the suffix specified in the device diagnostics profile. So if you select date/time stamp in the profile, the date/time stamp will also be appended during a run in which you have specified a different file name.

Related topics

For more information about...	See...
Opening diagnostics	“Opening diagnostics” on page 12
Profiles	“About profiles” on page 15

About device initialization

About this topic

When working in device diagnostics software, you are often required to initialize the device. This topic explains why device initialization is necessary.

Opening communications

Initializing a device opens communications with it. For example, if the device is connected with a serial cable, the COM port is opened, and if the device is connected with an Ethernet cable, the TCP/IP socket is connected.

Homing motors

Initializing a device homes motors that do not track their position along their line of travel. Homing a motor moves it until it triggers an event, called a home flag. This tells the motor its location.

The motors on some devices automatically move to their home positions when the device is turned on. The motors on other devices must be initialized to be homed.

Setting profile parameters

Initializing a device applies relevant parameters set in the device's profile.

Setting state and memory variables

Most devices store variables in software or firmware. Initializing a device sets these variables to their initial values.

Related topics

For information about...	See...
Using Diagnostics	❑ "About diagnostics" on page 11 ❑ "Opening diagnostics" on page 12
Workflow for configuring devices	"Adding devices" on page 10

MICROLAB STAR 2

The Hamilton MICROLAB STAR is an automated liquid pipettor that can be configured to work in lab automation systems running with VWorks.

This chapter contains the following topics:

- ❑ "Workflow for configuring the MICROLAB STAR" on page 28
- ❑ "Creating a MICROLAB STAR profile" on page 29
- ❑ "About VWorks software and the MICROLAB STAR" on page 31
- ❑ "Workflow for writing a protocol for the MICROLAB STAR" on page 32
- ❑ "Adding a line to a map file" on page 33
- ❑ "Setting MICROLAB STAR task parameters" on page 36
- ❑ "Managing MICROLAB STAR profiles" on page 39
- ❑ "Operating the MICROLAB STAR with diagnostics" on page 40

Workflow for configuring the MICROLAB STAR

About this topic

This topic presents the workflow for configuring the MICROLAB STAR device driver.

Read this topic if you are an administrator responsible for setting up devices in VWorks.

Before you start

Before you can configure the MICROLAB STAR device driver you must have installed it. For installation instructions, see "Setting the properties for a device" on page 16.

Workflow

Step	Topic
1	"Adding devices" on page 10
2	"Creating a MICROLAB STAR profile" on page 29
3	"Setting the properties for a device" on page 16

Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Setting MICROLAB STAR task parameters	"Setting MICROLAB STAR task parameters" on page 36
Creating and modifying MICROLAB STAR profiles	"Managing MICROLAB STAR profiles" on page 39
Operating the MICROLAB STAR directly	"Operating the MICROLAB STAR with diagnostics" on page 40

Creating a MICROLAB STAR profile

About this topic

This topic describes how to create a profile for the MICROLAB STAR. Creating a profile is an essential step for setting up the MICROLAB STAR device.

Read this topic if you are an administrator responsible for setting up devices in VWorks.

Before you start

Device manager

Before you create a profile, you must have added the MICROLAB STAR to the device manager.

Method files folder

Before you create a profile, you need to identify a folder on the controlling computer that contains, or will contain, the method files. Method files define the parameters used for each part of the pipetting operation.

For more information about these files, see "About VWorks software and the MICROLAB STAR" on page 31.

Sequence map file

Before you create a profile also need to identify or create the sequence map file that you want to use. The sequence map file includes a list of plate sequences.

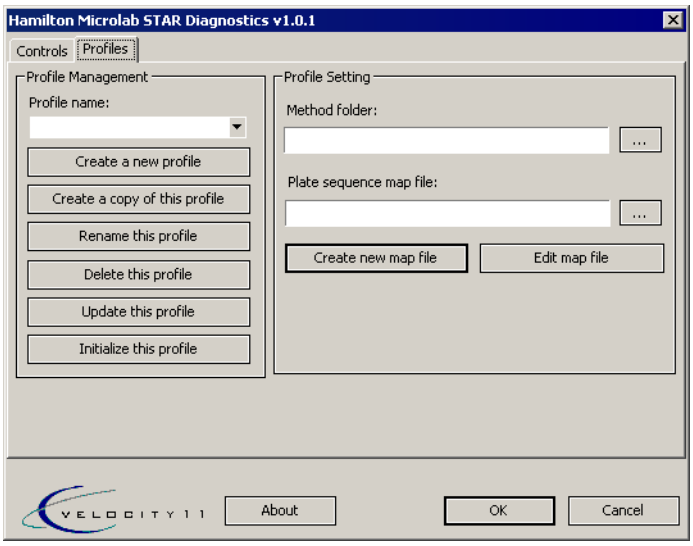
Sequence map files used by VWorks must only contain plate sequences with a single instance of SBS-compliant labware.

For more information about sequence map files, see "About VWorks software and the MICROLAB STAR" on page 31.

Procedure

To create a MICROLAB STAR profile:

1. Open **Hamilton MICROLAB STAR Diagnostics**.
2. Click the **Profiles** tab.



3. Click **Create a new profile**.
4. In the **Create Profile** dialog box, enter a name for the profile and click **OK**.

   The name appears in the **Profile name** box.
5. In the **Profile Setting** area, click the **Method folder** ellipsis button, navigate to the folder that contains the MICROLAB STAR method files, and click **OK**.
6. If you have not yet created a sequence map file, in the **Profile Setting** area:
   a. Click **Create new map file**.
   b. Browse to the folder in which you want to create the file.
   c. Type a name for the file, and click **Save**.
7. In the **Profile Setting** area, click the **Plate sequence map file** ellipsis button, navigate to the sequence map file you want to use, and click **Open**.
8. If you want to edit an existing sequence map file:
   a. Click **Edit map file**.

      The map file opens in your default text editor.
   b. Edit, save, and close the file.

Driver files folder

When you add a profile, a new folder named driver files is automatically created in the directory specified in the profile.

The folder contains a number of files used to initialize and operate the MICROLAB STAR. You will need to change the SystemDeck.lay file, when changing the deck layout as this file is used by the driver for pick and place operations.

File	Description
SystemDeck.lay	System deck file used by the driver to perform pick and place operations
Initialize.med	Method file used by the driver to initialize selected STARlet VWorks profile
_PickPlace.med	Method file used by the driver to transport plates between Biocel and STARlet

Related topics

For information about...	See...
Opening diagnostics	"Opening diagnostics" on page 12
Adding the MICROLAB STAR to the device manager	"Adding devices" on page 10
Map files	"Adding a line to a map file" on page 33
The next step	"Setting the properties for a device" on page 16
The workflow this procedure belongs to	"Workflow for configuring the MICROLAB STAR" on page 28
Profiles	"About profiles" on page 15
Initializing a device	"About device initialization" on page 25

About VWorks software and the MICROLAB STAR

About this topic

This topic explains how VWorks software and the MICROLAB STAR work together. It also explains some important concepts used by the MICROLAB STAR software.

Read this topic if you are an administrator or technician who writes VWorks protocols or MICROLAB STAR methods.

About VWorks and MICROLAB STAR software

To operate the MICROLAB STAR, in VWorks, you write a protocol with a Sub Process (Hamilton Microlab STAR) task. This task is the parent of a pipette process (sub-process) that contains one or more Microlab STAR pipette process tasks. These pipette process tasks do not directly define the liquid handling operations that take place on the MICROLAB STAR. They:

- ❑ Move plates between the VWorks-controlled lab automation system and specified positions on the MICROLAB STAR

- ❑ Initiate MICROLAB STAR methods that run liquid handling operations on the MICROLAB STAR

!! IMPORTANT !! You should be familiar with the MICROLAB STAR software before writing protocols.

About methods and plate sequences

The MICROLAB STAR performs liquid handling operations using methods, plate sequences, and system deck files. These are all MICROLAB STAR software concepts.

Methods

A method describes a liquid-handling process that the MICROLAB STAR performs. Methods include references to plate sequences.

Plate sequences

A plate sequence is a named collection of well locations with their associated labware types.

System deck files

A system deck file is a file that stores information about the labware, the labware locations on the MICROLAB STAR system deck, and plate sequences.

Related topics

For information about...	See...
Methods and plate sequences	MICROLAB STAR user documents
VWorks software	*VWorks Version 3 Automation Control User Guide*

Workflow for writing a protocol for the MICROLAB STAR

About this topic

This topic presents you the workflow for writing a protocol that transfers a plate from a plate store in the lab automation system to the MICROLAB STAR, performs a liquid handling operation, and returns the plate to the lab automation system's plate store.

Workflow

Step	Instructions
1.	Prepare a map file following "Adding a line to a map file" on page 33
2.	Create a protocol and add a plate icon following the instructions in the *VWorks Version 3 Automation Control User Guide*

Step	Instructions
3.	Learn about the tasks that the MICROLAB STAR uses in “Setting MICROLAB STAR task parameters” on page 36
4.	Add the Sub Process (Hamilton Microlab STAR) task following general instructions in “Adding and linking Sub Process tasks” on page 19
5.	Add and configure the Execute (Hamilton Microlab STAR method) task described in “Configuring a pipette process” on page 37
6.	Run the protocol following instructions in the *VWorks Version 3 Automation Control User Guide*

Adding a line to a map file

About this topic

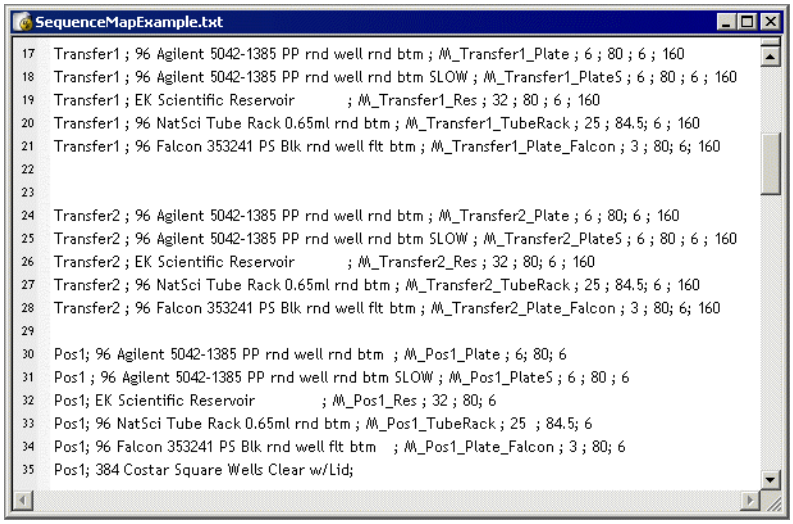
This topic takes you through the process of adding a line to a MICROLAB STAR sequence map file.

Read this topic if you are an administrator or technician who writes protocols that include liquid handling tasks on a MICROLAB STAR.

About sequence map files

A sequence map file is a text file that is needed for integration between VWorks and the MICROLAB STAR software. It translates the name of a MICROLAB STAR sequence with a VWorks location and labware type.

Part of a sequence map file is shown below.



Each line in the sequence map file represents an available position on either the transfer station (for example Transfer1) or the MICROLAB STAR deck (for example Pos1). A line is made up of a sequence of parameters, separated by semicolons.

Note: Other lines, which begin with //, are comment lines that are not processed by software.

A line in the sequence map file can be re-used by multiple Execute (Hamilton Microlab STAR method) tasks.

Procedure

This procedure assumes that you are editing an existing sequence map file and not creating one.

To add a line to the map file:

1. Open **MICROLAB STAR Diagnostics**.
2. Click the **Profiles** tab.
3. Click **Edit map file**.

   The map file opens in your default text editor.
4. Type ENTER to make a space for the new line in the sequence map file.

   Select a place in the file that corresponds to a location from which, or to which, you want to move the plate. For example, if you want to move the plate to or from position 1, make a new line under the set of lines in the Pos1 section in the file.
5. Type the following:
   a. Name of the location
   b. A semi-colon separator
   c. A space

      For example: `Pos1;`
6. In VWorks:
   a. Open the labware editor.
   b. View the type of labware that you are moving.
   c. Retype the name of the labware into the map file, making sure that you copied the name exactly.
   d. Add a semi-colon separator and another space, for example:

      Pos2; 384 Costar Square Wells Clear w/Lid;
7. In this manner, type in the other parameters, referencing the following table:

Parameter	Meaning
Plate sequence name	A unique name that you give to the plate sequence file that is used by the method selected for the pipette task in VWorks. Example: M_Transfer1_Plate_Falcon

Parameter	Meaning
Grip offset (mm)	For a plate, the distance between the top of the plate to the position where the gripper grips the plate. Typically 3–6 mm. For a rack, the distance between the top of the tube and the position where the gripper grips the rack. Typically 25 mm.
Grip width (mm)	The width of the labware at the place where the gripper holds the labware.
Grip force	The strength with which the MICROLAB STAR gripper grips the plate. The higher the number stronger the grip force. Use a higher grip force for heavier labware and a lower grip force for thin, flexible labware. Range:(2–9).
Retract distance (mm)	The distance that the MICROLAB STAR gripper pulls back from the transfer station before rotating. Set this distance to avoid a gripper collision.

8. In the MICROLAB STAR method editor software displaying the SystemDeck.lay file, drag the plate icon onto the position on the MICROLAB STAR that you want to move the plate to or from.
9. Open the sequence file that is automatically created and rename it the match the plate sequence name set earlier.
10. Reinitialize the profile in the Hamilton MICROLAB STAR Diagnostics.

    The sequence that you created is now available.

Related topics

For information about...	See...
The workflow that this procedure belongs to	“Workflow for writing a protocol for the MICROLAB STAR” on page 32
Plate sequence files	“About VWorks software and the MICROLAB STAR” on page 31

Setting MICROLAB STAR task parameters

About this topic

When the MICROLAB STAR is added to the device manager, the Sub Process (Hamilton Microlab STAR) task associated with the MICROLAB STAR becomes available in the protocol editor. When a task is added to a protocol, you need to set the parameters for it. This topic describes the task and its parameters.

Read this topic if you are:

- ❑ An administrator or technician responsible for creating protocols
- ❑ An operator who wants to make changes to the MICROLAB STAR task parameters in a protocol

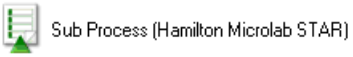
  Note: Operators cannot save changes to protocols.

About the MICROLAB STAR tasks

The MICROLAB STAR device driver adds two tasks.

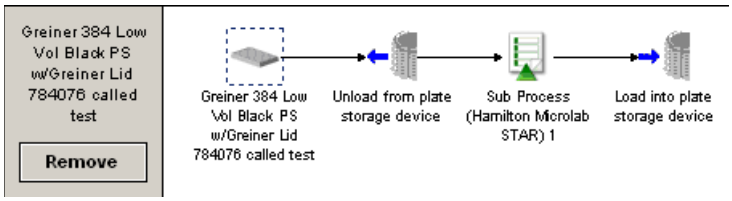
Sub Process (Hamilton Microlab STAR) task

This task is available in the protocol editor and is represented by this icon in the Protocol Tasks toolbar:



This task is a sub process task that indicates the existence of a subroutine within a protocol.

An example protocol that use this task is shown below:



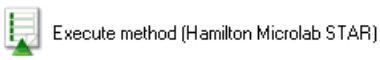
In this example, a plate is moved from a storage device to the MICROLAB STAR. A pipetting operation is performed by the Sub Process (Hamilton Microlab STAR) task, and the plate is returned to the storage device.

Once you have added and linked the task, you can configure the pipette process. The pipette process uses the Execute Hamilton Microlab STAR method task.

Execute (Hamilton Microlab STAR method)

This task is available in the Pre-Protocol, Post-Protocol, and Pipette Process editors.

The task is represented by this icon in the Pre/Post Protocol Tasks toolbar and Pipette Tasks toolbar:



The task moves one or more plates to the MICROLAB STAR, and runs a MICROLAB STAR software method.

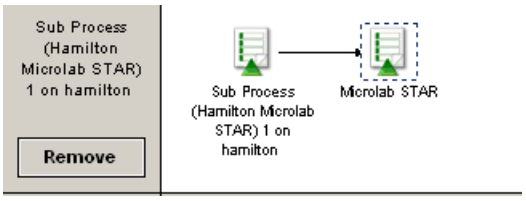
Note: The task parameters are slightly different when this task is used in a pre/post protocol process compared to when it is used in a pipette process.

Configuring a pipette process

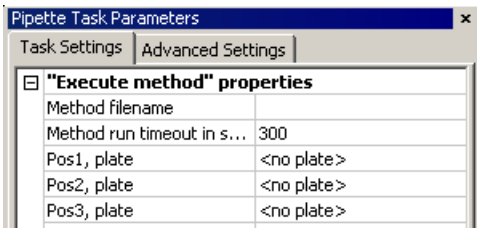
To configure a pipette process, you have to add the Execute (Hamilton Microlab STAR method) pipette task and set its parameters.

To configure the Execute (Hamilton Microlab STAR method) task:

1. Add the Execute (Hamilton Microlab STAR method) pipette task to the pipette process editor.



2. In the **Pipette Task Parameters** toolbar, make sure that the **Task Settings** tab is displayed and the **Execute method properties** is expanded.



3. From the **method filename** list, select the MICROLAB STAR method file that you want to use.

   The method file defines the pipetting operation.

   Note: For a method to be available, you have to select the method files folder in the profile.

4. In the **Method run timeout in seconds** box, select the time to elapse before an error message opens if the method does not end.

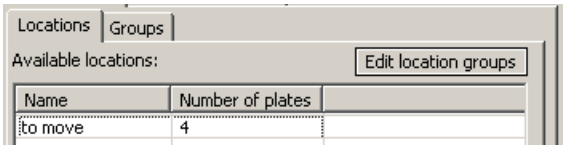
   This timeout value is needed because VWorks cannot directly monitor MICROLAB STAR error states. If there is no response from the MICROLAB STAR before the timeout, an error is created in VWorks. VWorks can then notify you of the problem by pager or email.

   The timeout value should be set to the expected length of the protocol plus about 25%.

5. From the drop-down lists, select the positions on the MICROLAB STAR that you want to hold the plates during the pipetting operation, one for each plate.

   You must select the same position for both left and right-hand boxes on each row.

   In the example protocol given earlier in this topic, the number of plates moved to the MICROLAB STAR is determined by the location groups of the Unload task.



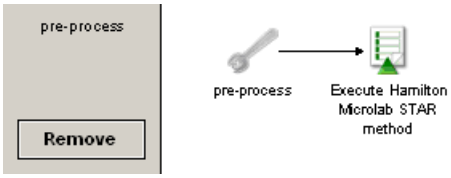
   You can now run the protocol.

Configuring a pre-protocol or post-protocol task

You can also use the Execute (Hamilton Microlab STAR method) task in a pre-protocol or post-protocol. This does not require the use of the Sub Process (Hamilton Microlab STAR) task parent task.

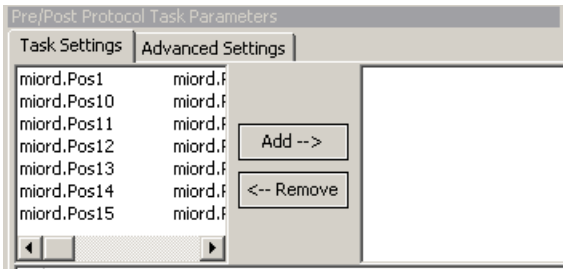
To configure the Execute (Hamilton Microlab STAR method) task in a pre-protocol or post-protocol:

1. Add the Execute Hamilton Microlab STAR method task to the pre-protocol or post-protocol editor.



2. In the **Pipette Task Parameters** toolbar, make sure that the **Task Settings** tab is displayed.
3. Select the MICROLAB STAR or MICROLAB STARs and click **Add**.

   The device name moves to the right of the **Add** and **Remove** buttons.



4. From the **method filename** list, select the MICROLAB STAR method file that you want to use for this pipette process.
5. In the **Method run timeout in seconds** box, select the time to elapse before an error message opens if the method does not end.

Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Adding and linking sub process tasks	"Adding and linking Sub Process tasks" on page 19
Using MICROLAB STAR Diagnostics	"Operating the MICROLAB STAR with diagnostics" on page 40
Location groups	*VWorks Version 3 Automation Control User Guide*
Unload task	*VWorks Version 3 Automation Control User Guide*

Managing MICROLAB STAR profiles

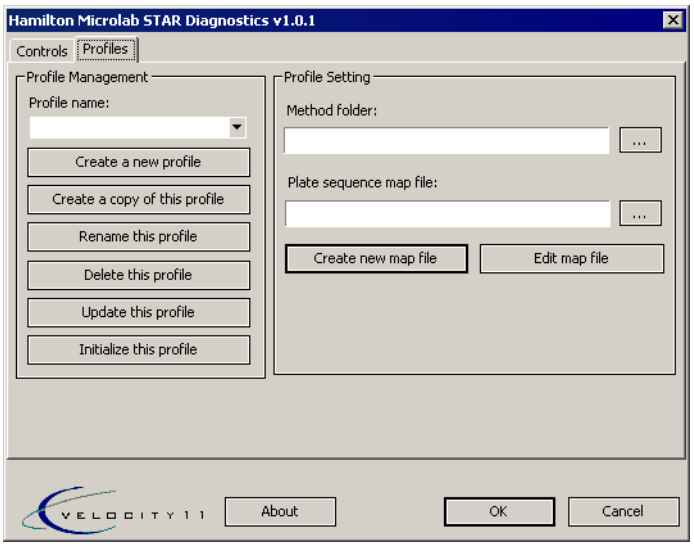
About this topic

This topic describes how administrators and technicians can manage MICROLAB STAR profiles.

Managing profiles

To manage MICROLAB STAR profiles:

1. Open **MICROLAB STAR Diagnostics**.
2. Click the **Profiles** tab.



3. Select a profile from the **Profile name** list.
4. Perform the management task.

   Management tasks include the following:

- Updating the profile. Use this command to save edits to an existing profile.
- Copying a profile.
- Renaming a profile.
- Deleting a profile.

Related topics

For more information about...	See...
Opening diagnostics	"Opening diagnostics" on page 12
The workflow for configuring the MICROLAB STAR	"Workflow for configuring the MICROLAB STAR" on page 28
Creating a MICROLAB STAR profile	"Creating a MICROLAB STAR profile" on page 29
Operating the MICROLAB STAR	"Operating the MICROLAB STAR with diagnostics" on page 40

Operating the MICROLAB STAR with diagnostics

About this topic

This topic describes how to:

- ❑ Open direct communications with the MICROLAB STAR
- ❑ Move a plate from one position to another
- ❑ Run a method
- ❑ Stop a method run
- ❑ Monitor the status of the MICROLAB STAR

Read this topic if you are an operator who wants to troubleshoot or operate the MICROLAB STAR using direct commands.

Before you start

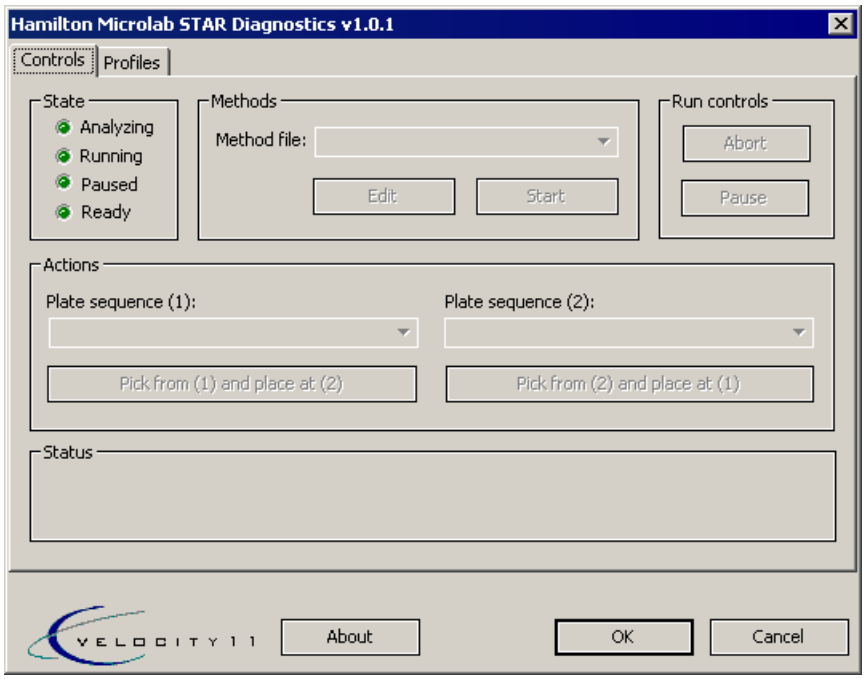
Before you can send commands to the MICROLAB STAR, or receive status information from the MICROLAB STAR, you need to initialize it.

To initialize the MICROLAB STAR:

1. Open **MICROLAB STAR Diagnostics**.
2. Click the **Profiles** tab.
3. Click **Initialize this profile**.

Controls page

The operating procedures in this topic use the Controls page of the Hamilton MICROLAB STAR Diagnostics.



Moving a plate

To move a plate:

1. Open **MICROLAB STAR Diagnostics**.
2. Click the **Controls** tab.
3. From the **Plate sequence (1)** list, select either the starting or ending plate position.
4. From the **Plate sequence (2)** list, select the other plate position in the move.
5. Click either:
   - Pick from (1) and place at (2)
   - Pick from (2) and place at (1)

   The plate is moved from one position to the other.

Running a method

To run a method:

1. Open **MICROLAB STAR Diagnostics**.
2. Click the **Controls** tab.
3. From the **Method file** list, select a method.
4. If you want to change the file, click **Edit**.

   The file opens in your default text editor.
5. Click **Start**.

Stopping a method run

To stop a method run:

1. Open **MICROLAB STAR Diagnostics**.

2. Click the **Controls** tab.
3. Either:
   - Click **Abort** to end the method run and clear the message that opens after performing one of the following checks:

If...	Then...
The tips are on	Confirm that it is safe for the channels to move across the deck
A plate is in the gripper	Move the gripper to a safe location, open the gripper to release the plate, and initialize

   - Click **Pause** to pause the run and **Resume** to continue.

Monitoring the status of the MICROLAB STAR

To monitor the status of the MICROLAB STAR:

1. Open **MICROLAB STAR Diagnostics**.
2. Click the **Controls** tab.
3. Look at the status lights in the **State** area.

Light	Meaning
Analyzing	The method's syntax is being checked
Running	A method is now running
Paused	Either: ❑ The method has been paused by the operator ❑ The MICROLAB STAR has experienced an error and is waiting for the operator to resolve the problem
Ready	The MICROLAB STAR is ready to run a method

Related topics

For more information about...	See...
Opening diagnostics	"Opening diagnostics" on page 12
The workflow for configuring the MICROLAB STAR	"Workflow for configuring the MICROLAB STAR" on page 28
Creating a MICROLAB STAR profile	"Creating a MICROLAB STAR profile" on page 29
Managing MICROLAB STAR profiles	"Managing MICROLAB STAR profiles" on page 39
Initializing a device	"About device initialization" on page 25

Changing the deck layout

About this topic

This topic summarizes the workflow needed to set up a different deck configuration on the MICROLAB STAR.

Workflow

To change the configuration of the MICROLAB STAR deck:

1. Create a new methods folder containing the methods you will run with the new deck layout.
2. Create a new profile for the MICROLAB STAR in VWorks and associate it with the new methods folder.

   The driver automatically creates a new Driver Files folder that contains the following files:

   - SystemDeck.lay (representing an empty deck)
   - Initialize.med
   - _PickPlace.med
3. Create a new system deck file.
4. Define a new system deck layout.

   You do this by adding carriers and labware to the new SystemDeck.lay file and then defining sequences in it.

   Ideally, use the SystemDeck.lay file for all new methods. However, you can define as many new deck layout files as you want, providing you use the same carriers and labware in the same locations defined the SystemDeck.lay file.
5. Create a new sequence map file or revise an existing one if any of the following is true:

   - The new system deck layout will use labware that you have not used before
   - Any of the labware used in VWorks protocols was renamed
   - Any sequences that have not been used before were created in the system deck file
   - Additional labware carriers were introduced to the STARlet deck

Agilent Technologies

User Guide

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